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October 3, 2005

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# Acquisition

## Audit of the Common Submarine Radio Room (D-2006-001)

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Department of Defense  
Office of the Inspector General

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### **Acronyms**

ACAT	Acquisition Category
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
CSRR	Common Submarine Radio Room
ISP	Information Support Plan
JROCM	Joint Requirements Oversight Council Memorandum
KPP	Key Performance Parameter
LRIP	Low-Rate Initial Production
TEMP	Test and Evaluation Master Plan



INSPECTOR GENERAL  
DEPARTMENT OF DEFENSE  
400 ARMY NAVY DRIVE  
ARLINGTON, VIRGINIA 22202-4704

October 3, 2005

MEMORANDUM FOR NAVAL INSPECTOR GENERAL

SUBJECT: Audit of the Common Submarine Radio Room (Report No. D-2006-001)

We are providing this report for review and comment. We considered management comments on a draft of this report in preparing the final report.

DoD Directive 7650.3 requires that all recommendations be resolved promptly. Therefore, we request that the Program Manager, Common Submarine Radio Room reconsider his position on Recommendation A. and comment on the final report by November 2, 2005.

If possible, please send management comments in electronic format (Adobe Acrobat file only) to [AudATM@dodig.osd.mil](mailto:AudATM@dodig.osd.mil). Copies of the management comments must contain the actual signature of the authorizing official. We cannot accept the / Signed / symbol in place of the actual signature. If you arrange to send classified comments electronically, they must be sent over the SECRET Internet Protocol Router Network (SIPRNET).

We appreciate the courtesies extended to the staff. Questions should be directed to Mr. Rodney D. Britt at (703) 604-9096 (DSN 664-9096) or Mr. John E. Meling at (703) 604-9091 (DSN 664-9091). See Appendix E for the report distribution. The team members are listed inside the back cover.

By direction of the Deputy Inspector General for Auditing:

A handwritten signature in black ink, reading "Mary L. Ugone", is positioned above the printed name.

Mary L. Ugone  
Assistant Inspector General  
Acquisition and Technology Management

# Office of the Inspector General of the Department of Defense

Report No. D-2006-001

October 3, 2005

(Project No. D2004AE-0222.000)

## Audit of the Common Submarine Radio Room

### Executive Summary

**Who Should Read This Report and Why?** Civil Service and military personnel involved in the management, support, and acquisition of the Common Submarine Radio Room (CSRR) should read this report because it discusses testing, information assurance, and cost estimating issues that must be addressed before the CSRR Program progresses further through the acquisition process. Additionally, acquisition officials responsible for overseeing programs should also read this report.

**Background.** Navy commanders rely on the fleet's submarine radio rooms to send and receive strategic and tactical command and control information, including messages to and from the National Command Authority. In a February 1995 mission need statement, the Navy identified the need for an updated, integrated exterior communications system, or radio room, on all submarine classes to support missions in the areas of command and control, intelligence, and logistics.

In March 1998, the Naval Sea Systems Command awarded a contract to General Dynamics, Electric Boat Division, Groton, Connecticut, for the new construction of *Virginia*- and *Sea Wolf*-classes that included an upgraded radio room design that the CSRR Program is now using.

In November 2001, the Program Executive Officer, Command, Control, Communications, Computers and Intelligence and Space, Space and Naval Warfare Systems Command approved the CSRR, an acquisition category III program, as an upgrade to the *Ohio*- and *Los Angeles*-classes of submarines.

The CSRR will provide secure, reliable, and covert communications for all submarine classes by integrating communication system components that are being developed for other Navy acquisition programs, as well as the Global Broadcast Service component being developed by the Air Force. As of April 2005, the development contract for the CSRR Program totaled \$9.5 million. Throughout its life cycle, the CSRR Program is estimated to cost \$1.43 billion: \$152 million in research, development, test and evaluation funds; \$624 million in operations and maintenance funds; and \$657 million in procurement funds to develop, procure, and maintain the 67 radio rooms that the Navy plans to use for operations, testing, and training.

**Results.** The program manager did not schedule an operational assessment of the CSRR on the *Ohio*-class before the low-rate initial production decision review in June 2005. As a result, the program manager was not able to inform the milestone decision authority of its potential operational effectiveness and suitability. An operational assessment of the CSRR on the *Ohio*-class would have provided the milestone decision authority with test information needed to make an informed decision on whether to further invest in the CSRR Program technology at the low-rate initial production decision review (finding A).

The program manager also did not complete a revised information support plan and its requirements for the CSRR Program before the low-rate initial production decision in June 2005. As a result, the program manager was not able to inform the milestone decision authority of progress toward satisfying the information support requirements for the CSRR. Approval of a revised information support plan will provide the milestone decision authority with better assurance that the CSRR Program is ready for further low-rate initial production (finding B).

The program manager did not timely determine the effect that delays in receiving approval of the test and evaluation master plan or the decision to support spiral development through 2024 had on the CSRR life-cycle costs. As a result, the program manager did not provide the milestone decision authority and the Navy resource sponsor with cost information that they needed to assess the magnitude of program costs and make timely decisions concerning the CSRR Program's budget. The Program Executive Officer revised the cost-estimating policy and the program manager tasked the support contractor with monitoring and updating the CSRR Program's life-cycle cost estimate in compliance with the policy. Therefore we are not making a recommendation to accompany this finding (finding C).

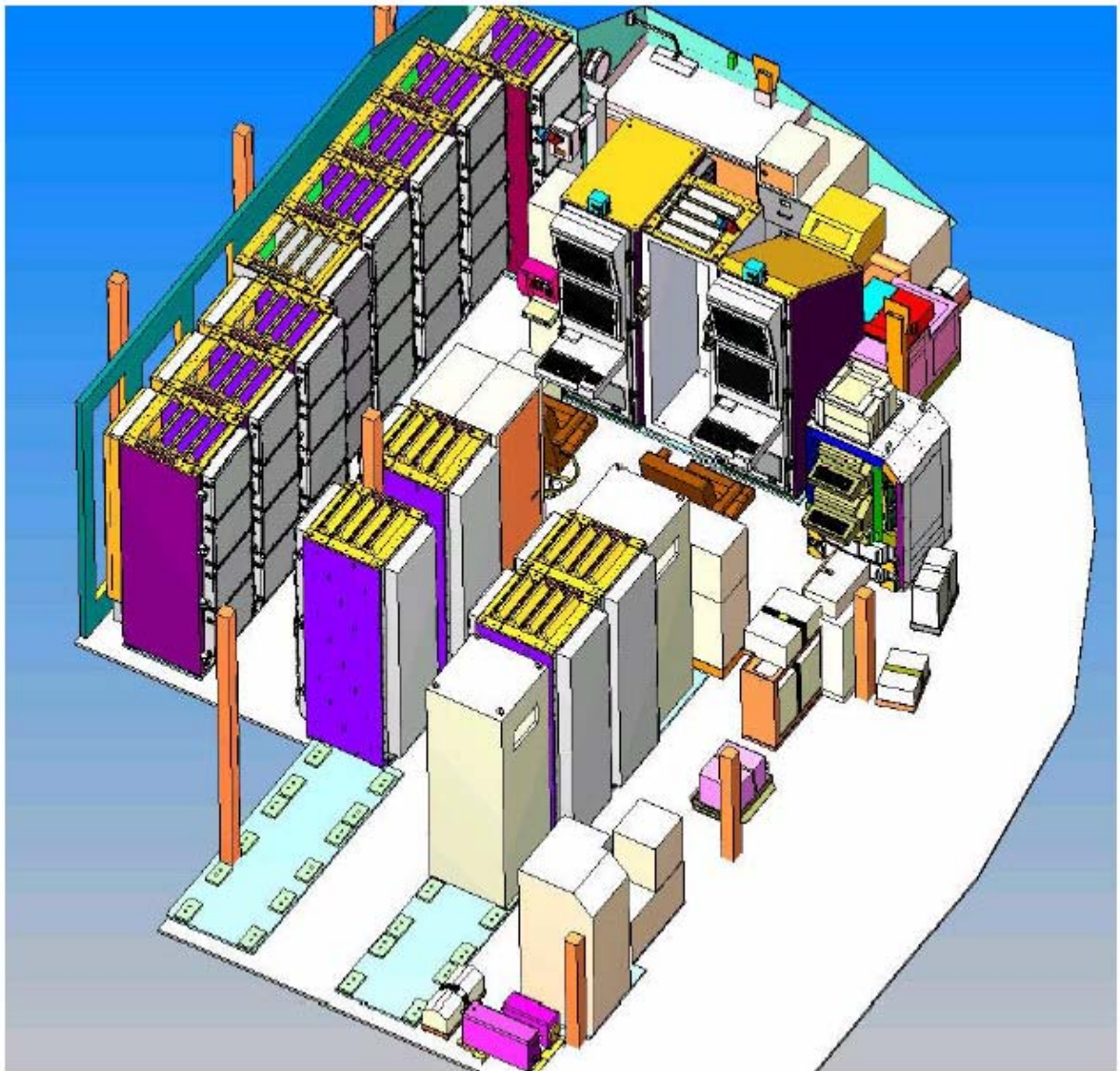
**Management Comments.** The Deputy Assistant Secretary of the Navy (Command, Control, Communications, Computers, Intelligence and Space), Office of the Assistant Secretary of the Navy, Research, Development and Acquisition and the Program Manager, Common Submarine Radio Room responded. Although the Deputy Assistant Secretary did not agree that an operational assessment was required before the next low-rate initial production decision, the program manager stated that the milestone decision authority did require the completion of a 60-day development test on the *Sea Wolf*-class before additional CSRR sets would be purchased for the *Ohio*-class submarines. The program manager also stated that the FY 2006 low-rate initial production sets will be procured to permit an orderly increase in the system production rate towards full-rate production. The program manager concurred with the recommendations to submit the information support plan to the Joint Staff, J-6 for review and approval and to prepare an overarching CSRR Information Support Plan for all submarine classes. In addition to the corrective actions cited in the draft report, the program manager stated that he scheduled an independent cost estimate for the CSRR Program to adequately define and independently verify all costs before the FY 2006 program review.

**Audit Response.** The Navy's plan to conduct a 60-day test of the CSRR on the *Sea Wolf*-class submarine will meet the intent of the recommendation if the program manager requests the Commander, Operational Test and Evaluation Force to participate in the tests and report to the milestone decision authority on the potential for the CSRR Program to operate effectively and suitably before the FY 2006 low-rate initial production program review. Accordingly, we request that the Program Manager, Common Submarine Radio Room comment on that issue in response to the final report by November 2, 2005.

# Table of Contents

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<b>Executive Summary</b>	i
<b>Background</b>	1
<b>Objectives</b>	3
<b>Managers' Internal Control Program</b>	4
<b>Findings</b>	
A. Operational Assessment of the Common Submarine Radio Room	5
B. Information Support Plan Requirements for Low-Rate Initial Production	10
C. Life-Cycle Cost Estimate for the Common Submarine Radio Room Program	16
<b>Appendixes</b>	
A. Scope and Methodology	19
B. Glossary	21
C. Description and Status of Key Technical Components and Software	25
D. Another Matter of Interest	28
E. Report Distribution	29
<b>Management Comments</b>	
Department of the Navy	31



**Basic Configuration of the Common Submarine Radio Room for the  
*Ohio*-class Submarine**



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## Background

Navy commanders rely on the fleet's submarine radio room to send and receive strategic and tactical command and control information, including messages to and from the National Command Authority.

In a February 1995 mission need statement, the Navy identified the need for an updated and integrated exterior communications system, or radio room, on all classes of submarines to support missions in the areas of command and control; intelligence, reconnaissance, and surveillance; strike warfare, special operations forces; anti-submarine warfare; anti-surface warfare; and mine warfare. In March 1997, the Space and Naval Warfare Systems Command attempted to redesign the radio room on the *Los Angeles*-, *Virginia*- and *Sea Wolf*-classes, but the space planned for the *Los Angeles* radio room did not fit into the space planned for the *Virginia* and *Sea Wolf* radio rooms. As a result, the Naval Sea Systems Command decided to develop the radio room for the *Virginia*-class. In March 1998, the Naval Sea Systems Command awarded a contract to General Dynamics Electric Boat Division, Groton, Connecticut, to include an upgraded radio room in the design and construction of *Virginia*-class, and in 2001, it awarded a similar contract for the *Sea Wolf*-class. At that point, the Navy recognized the future benefit in personnel, training, and maintenance that could be realized by operating a similar radio room in all submarine classes. Accordingly, the Assistant Secretary of the Navy (Research, Development and Acquisition) and the Chief of Naval Operations directed the Naval Sea Systems Command and the Space and Naval Warfare Systems Command to work toward establishing a common design.

In November 2001, the Program Executive Officer, Command, Control, Communications, Computers and Intelligence and Space, formerly known as the Director, Communication Systems Program Directorate, Space and Naval Warfare Systems Command, approved the development of the Common Submarine Radio Room (CSRR) Program as an acquisition category (ACAT) III program to upgrade the *Ohio*- and *Los Angeles*-classes of submarines. The figure illustrates the placement of the radio room architecture on the *Ohio*-class.

**CSRR Program.** The Program Executive Officer, Command, Control, Communications, Computers, and Intelligence and Space, Space and Naval Warfare Systems Command, referred to in this report as the Program Executive Officer, approved the program manager's plan to use the *Virginia*-class to design the architecture for the CSRR Program. When fully installed, the CSRR Program will provide timely, secure, reliable, and covert communications for the *Virginia*-, *Sea Wolf*-, *Ohio*-, and *Los Angeles*-classes. Additionally, the CSRR will provide submarine commanders with access to multiple frequency links through the components that are being developed by other Navy acquisition program managers, as well as frequency links through the Global Broadcast Service component being developed by the Air Force.

The CSRR will accomplish secure, over-the-air satellite communications through very low, high, very high, ultra-high, and extremely high frequency data links.

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Simultaneous voice and data communications will reduce the time that submarine commanders stay at periscope depth and remain visible to enemy forces.

**Acquisition History and Strategy.** In November 2001, when the CSRR Program began, the program manager directed the Technical Direction Agent, Naval Undersea Warfare Center, Newport, Rhode Island, to design the CSRR architecture for the *Ohio*-class. The November 2002 acquisition strategy that the program manager is using shows an evolutionary acquisition approach using spiral development to design and develop the CSRR Program. The program manager plans to use three incremental phases to counter diminishing manufacturing sources and materiel shortages. During the first increment, the CSRR Program team will develop the radio room for the *Ohio*-class ballistic-missile and guided-missile submarines. For each future increment, integrated components will be researched and developed in 2-year minor upgrades or 3-year major upgrades for all submarine classes. The acquisition strategy also states that the evolutionary development approach will reduce training requirements, improve logistics support, and allow rapid insertion of new technology across the submarine classes. The acquisition strategy identified a schedule for installing the radio room on the *Ohio*-, *Virginia*-, and *Sea Wolf*-classes but not for the *Los Angeles*-class.

In December 2003, the program manager awarded a contract to Lockheed Martin Technical Systems (Lockheed), Eagan, Minnesota, to develop the control and management software for the CSRR. Lockheed, who is a subcontractor for Electric Boat, is also responsible for developing the CSRR software for the *Virginia*- and *Sea Wolf*-classes. As of April 2005, the software development contract for the CSRR Program totaled \$9.5 million.

Throughout its life cycle, the Navy estimates that the CSRR Program will cost \$1.43 billion: \$152 million in research, development, test and evaluation funds; \$624 million in operation and maintenance funds; and \$657 million in procurement funds to develop, procure and maintain the 67 radio rooms that the Navy plans to use for operations, testing, and training.

**Program Management.** Because of differences in program funding, the *Virginia*- and *Sea Wolf*-classes and four *Ohio*-class, guided-missile submarines were funded as part of ship construction or conversion programs and the *Los Angeles*- class and 14 *Ohio*- ballistic-missile class submarines were funded as ship alteration programs. The Program Manager, CSRR, oversees the design, development, and procurement of 14 *Ohio* ballistic-missile class submarines and 43 *Los Angeles*-class submarines

Because the acquisition strategy requires the *Virginia*- and *Sea Wolf*-classes to be included as part of the CSRR Program, the Naval Sea Systems Command tasked the CSRR Program Manager, as the Participating Activity Resources Manager, to acquire radio rooms for its 30 *Virginia*- and 3 *Sea-Wolf*-classes when they are upgraded. In turn, the CSRR Program Manager tasked the Naval Undersea Warfare Center with maintaining the integrated test facility for the CSRR; the System Center, Charleston, South Carolina, to provide the in-service engineering

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for CSRR integration and installation; and the System Center at the Space and Naval Warfare Systems Command, San Diego, California, to provide software support.

Because the CSRR Program is on the Director, Operational Test and Evaluation Oversight List, the Director must review and approve the CSRR test and evaluation master plan (TEMP). In March 2005, the Office of the Assistant Secretary of the Navy (Research, Development and Acquisition) directed the program manager to submit a request to the Navy Acquisition Executive to upgrade the CSRR Program to an ACAT II program because the estimated research, development, test, and evaluation funds exceeded \$140 million and because of increased interest from senior Navy decision makers in the program's status. Accordingly, when the CSRR Program was upgraded to an ACAT II program in April 2005, the Assistant Secretary of the Navy (Research, Development, and Acquisition) replaced the Program Executive Officer as the milestone decision authority for the acquisition and the upgrade of the *Ohio*-, *Los Angeles*- and *Sea Wolf*-classes. The Program Executive Officer, Submarines, Naval Sea Systems Command is the milestone decision authority for the new construction of the *Virginia*-class.

In February 2005, the program manager approved the installation of the CSRR components on four *Ohio*-class, guided-missile submarines to meet ship construction and overhaul schedules. In June 2005, the Assistant Secretary of the Navy (Research, Development and Acquisition) held a low-rate initial production (LRIP) decision review on the CSRR Program for the *Ohio*-class submarine. A representative from the Office of the Assistant Secretary of the Navy (Research, Development and Acquisition) stated that the Navy Acquisition Executive approved the low-rate initial production of two sets for use in training facilities.<sup>1</sup> The representative also stated that the program office would request approval to build four additional sets for four ballistic missile submarines in FY 2006 after another program review.

## Objectives

The audit objective was to evaluate the overall management of the CSRR Program. Because the program was in the system development and demonstration acquisition phase of the acquisition process, we determined whether management was cost-effectively readying the program for the production phase of the acquisition process. We also reviewed the adequacy of the management control program as it relates to the audit objective. See Appendix A for a discussion of the scope and methodology and Appendix D for another matter of interest related to the acquisition strategy.

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<sup>1</sup> On June 24, 2005, we requested a copy of the Acquisition Decision Memorandum for the LRIP decision.

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## Managers' Internal Control Program

DoD Directive 5010.38, "Management Control Program," August 26, 1996, and DoD Instruction 5010.40, "Management Control Program Procedures," August 28, 1996, require DoD organizations to implement a comprehensive system of management controls to provide reasonable assurance that programs are operating as intended and to evaluate the adequacy of the controls.

**Scope of the Review of the Management Control Program.** In accordance with DoD policy, acquisition managers are to use program cost, schedule, and performance parameters as control objectives to implement the requirements of DoD Directive 5010.38. Accordingly, we limited our review to management controls directly related to the areas of test and evaluation, information support plan (ISP) requirements, and life-cycle cost estimating for the CSRR Program.

**Adequacy of Management Controls.** We identified management control weaknesses, as defined by DoD Instruction 5010.40, relating to conducting an operational assessment before the LRIP for the CSRR Program, preparing and obtaining approval for an ISP, and updating the life-cycle cost estimate. Specifically, the program manager did not schedule an operational assessment or complete an ISP before the LRIP decision, and did not timely determine the effect that delays in receiving approval of the TEMP and the decision to support spiral development through FY 2024 had on CSRR Program life-cycle costs. Recommendations A., B.1., and B.2., if implemented, will ensure adherence to regulatory requirements. We offered no recommendation for finding C because the Program Executive Officer acknowledged the related management control weakness and corrected the deficiency before we issued the draft audit report. We will provide a copy of the report to the senior Navy official responsible for management controls in the Department of the Navy.

**Adequacy of Management's Self-Evaluation.** The Program Executive Officer performed annual reviews of the CSRR Program's assessable units to satisfy the management control requirements. The Program Executive Officer used management reviews, audits, inspections, investigations and other management information, such as knowledge of daily operations of programs and functions, to evaluate the assessable units. The Program Executive Officer based his annual statements of assurance on the results noted during the reviews of the assessable units. However, in the self-evaluations, he did not identify the management control weaknesses in testing and the information support plan because the self-evaluations did not review those specific areas as part of the assessable units. The Program Executive Officer also did not identify the CSRR Program as a separate assessable unit.

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## A. Operational Assessment of the Common Submarine Radio Room

The program manager did not schedule an operational assessment of the CSRR on the *Ohio*-class before he requested an LRIP decision review from the milestone decision authority because:

- Eleven radio room hardware and software components needed for the assessment were not available for integration;
- The program manager believed that earlier, but incomplete, developmental testing on the *Sea Wolf*- and *Virginia*-classes minimized the risk that LRIP sets would satisfy Navy requirements; and
- The Program Executive Officer (the previous milestone decision authority) did not require the program manager to complete an operational assessment before the LRIP milestone decision review.

As a result, the program manager was not able to provide an evaluation of the potential operational effectiveness and suitability of the CSRR on the *Ohio*-class to the milestone decision authority at the LRIP decision review in June 2005, thereby increasing the risk that the LRIP units will not perform as intended. Because of the limited test results, the program manager reduced the number of CSRR sets that he planned to request at the LRIP decision from five sets to two sets.

## DoD Policy for Low-Rate Initial Production

**DoD Instruction 5000.2.** DoD Instruction 5000.2, “Operation of the Defense Acquisition System,” May 12, 2003, states that the two purposes of LRIP are to demonstrate adequate and efficient manufacturing capability at the completion of manufacturing development and to produce the minimum quantity necessary to provide production or production-representative articles for initial operational test and evaluation. The Instruction requires an acquisition program to demonstrate acceptable performance in the development, test and evaluation, and operational assessment phases of the acquisition process before entering into LRIP. Furthermore, the Instruction requires the Service (the Navy) to perform an independent operational assessment before releasing each successive increment to the user because it provides warfighter and acquisition decision makers with a prediction of the potential operational effectiveness and suitability of a weapon system before an investment is made in production units for operational testing.

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## Status of CSRR Component and Software Development

Since the CSRR Program began in November 2001, the program manager experienced test schedule delays because of development problems and late deliveries for 11 hardware and software components. As of July 2005, the program manager had resolved problems with nine components and software, but the Digital Modular Radio and the Multifunctional Cryptographic System components were still either in development or did not function as required.

**Digital Modular Radio.** A representative from the Digital Modular Radio program office stated that the radio failed waveform testing in 2004. The next version, 6.4.1, is planned for release in December 2005 and is expected to pass the waveform testing requirements.

**Multifunctional Cryptographic System.** Acquisition managers at the Space and Naval Warfare Systems Command decided to redesign the Multifunctional Cryptographic System in October 2004 after it did not pass security testing. As a result, the program manager replaced the component in the CSRR architecture with the Modern Legacy Crypto System, which is expected to complete testing by the end of 2005.

As a result of late development and delivery of the hardware and software components for the CSRR, the program manager did not complete developmental testing before the June 2005 LRIP decision. Initially, the program manager planned to request five CSRR sets at the June 2005 LRIP decision review for two *Ohio*-class, ballistic-missile submarines; two training facilities; and the Naval Undersea Warfare Center test facility.

## Operational Assessment

At the June 2005 LRIP decision, the program manager requested the authority to purchase two CSRR sets for two *Ohio*-class, ballistic-missile submarines. However, the program manager did not schedule an operational assessment of the CSRR on the *Ohio*-class before the LRIP decision review because 11 key CSRR components were still in development under other acquisition programs.

Because the Navy is designing the CSRR to be its primary communication tool for submarines, an operational assessment of the CSRR configuration on the *Ohio*-class was needed and should have been required before the Navy procured and installed additional CSRR sets.

A representative from the Office of the Director, Operational Test and Evaluation also stated that CSRR developmental testing was not adequate to support an LRIP decision in June 2005. The representative stated that only 75 percent of the CSRR requirements had been verified and that an operational assessment should have been performed before the Navy invested further in CSRR hardware sets.

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## Reliance on Developmental Test Results for Other Submarine Classes

The program manager stated that the Program Executive Officer (the previous milestone decision authority) did not require the program office to obtain an operational assessment before the LRIP milestone decision review because he was confident that the system was successfully tested during the development phase on the *Virginia*- and *Sea Wolf*-classes. The program manager also believed that earlier testing on the *Virginia*- and *Sea Wolf*-classes minimized the risk of purchasing additional CSRR sets for the *Ohio*-class.

The program manager planned to use the results of a CSRR operational assessment of the *Sea Wolf*-class that was to be performed in February 2005 to prepare for the LRIP decision review. However, the planned operational assessment did not occur because the *Sea Wolf*-class with the installed CSRR components was being overhauled and therefore was not available for the operational assessment. As a result, a CSRR operational assessment was not performed on the *Sea Wolf* before the June 2005 LRIP decision to invest in two additional sets of the CSRR for the *Ohio*-class. Further, the program manager for the *Virginia*- and *Sea Wolf*-classes deferred further CSRR testing of technological capabilities because the components needed for the testing were not available for integration. An operational assessment of the CSRR for the *Ohio*-class is scheduled for the first quarter of FY 2006.

## Conclusion

The audit team briefed a representative from the Office of the Assistant Secretary of the Navy (Research, Development and Acquisition) on the need to comply with the requirement in DoD Instruction 5000.2 to perform an operational assessment before the LRIP decision. The representative agreed that more developmental testing was needed. Accordingly, until additional developmental testing could be completed, the Navy Acquisition Executive authorized the program manager to procure only two sets of the CSRR for two land-based sets instead of the two sets the program manager requested for the *Ohio*-class, ballistic missile submarines and the five sets the program manager initially planned to request at the LRIP decision review.

Because developmental testing was not completed for the CSRR before the LRIP decision in June 2005, an early operational assessment was even more essential to the milestone decision authority in evaluating the potential of the integrated system to meet the operational requirements. By not adhering to the mandatory requirement to perform an independent operational assessment of the CSRR before the LRIP decision review, the program manager increased the risk that CSRR sets produced under LRIP will not perform as intended. The risk increased because the program manager was not able to inform the Navy Acquisition Executive whether the CSRR was potentially operationally effective and suitable at the LRIP decision review in June 2005.

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## Recommendations, Management Comments, and Audit Response

**A. We recommend that the Program Manager, Common Submarine Radio Room delay the FY 2006 program review of the four low-rate initial production sets until he obtains an operational assessment which states that the Common Submarine Radio Room for the *Ohio*-class is potentially operationally effective and suitable.**

**Navy Comments.** The Deputy Assistant Secretary of the Navy (Command, Control, Communications, Computers, Intelligence and Space), Office of the Assistant Secretary of the Navy, Research, Development and Acquisition nonconcurred with the recommendation, stating that DoD Instruction 5000.2 and Secretary of the Navy Instruction 5000.2C did not establish a mandatory requirement for the Navy Commander, Operational Test and Evaluation to conduct an operational assessment of the Common Submarine Radio Room before the milestone decision authority made a Milestone C, LRIP decision for the system. The Deputy Assistant Secretary stated that the milestone decision authority's position was that an operational assessment was not necessary and that the DoD Office of the Inspector General had no technical basis to determine the specific level of detail that a milestone decision authority requires to make an LRIP decision.

Instead of an operational assessment to support the FY 2006 LRIP program review, the milestone decision authority required the CSRR program office to demonstrate CSRR system maturity by completing a 60-day developmental testing and land-based hardware and software reliability testing of the *Sea Wolf*-class submarine in accordance with a plan that the Acquisition Coordination Team approved. The CSRR program manager stated that implementation of the plan will enable the program office to certify the CSRR system robustness before installation on the first *Ohio*-class submarine.

**Audit Response.** Contrary to the Deputy Assistant Secretary's assertion, DoD Instruction 5000.2 states that entrance into Milestone C, LRIP, depends on the following criteria:

Acceptable performance in development, test and evaluation and **operational assessment** (emphasis added); mature software capability; no significant manufacturing risks; an approved Capability Production Document (CPD); **acceptable interoperability** (emphasis added); **acceptable operational suitability** (emphasis added); compliance with the DoD Strategic Plan; and demonstration that the system is affordable throughout the life cycle, optimally funded, and properly phased for rapid acquisition.

The Instruction, under reporting requirements, requires that an operational assessment be prepared in support of the Milestone C, LRIP decision by showing that an operational test agency report of operational test and evaluation results is required at the Milestone C decision review. It is unclear as to why the milestone



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decision authority is reluctant to include the operational test and evaluation community in determining whether the system has the potential of being operationally effective and suitable.

Further, as stated in the finding, the Office of the Director, Operational Test and Evaluation stated that an operational assessment should have been performed before the Navy invested further in CSRR hardware sets.

To satisfy the operational assessment requirement before the FY 2006 LRIP decision review, the Commander, Operational Test and Evaluation could, if requested, oversee the conduct of the 60-day developmental testing and land-based hardware and software reliability testing of the *Sea Wolf*-class submarine and prepare an operational assessment in support of the decision review. Before a further investment decision is made on the CSRR Program, an operational assessment must be conducted to justify the continued investment in LRIP units and to provide the milestone decision authority with assurance that the CSRR, potentially, will operate as intended and reduce program risk.

Accordingly, we request that the Program Manager, Common Submarine Radio Room reconsider his position on Recommendation A. in response to the final report.

For the complete text of the Navy's comments, see the Management Comments section of the report.

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## B. Information Support Plan Requirements for Low-Rate Initial Production

The program manager did not complete an ISP for the CSRR Program before requesting an LRIP decision from the milestone decision authority in June 2005. The Program Manager needed a revised ISP to:

- Adequately evaluate the interoperability key performance parameter (KPP) for the CSRR sets; and
- Identify test requirements to measure the new net-ready KPP for the CSRR sets.

These conditions occurred because the previous milestone decision authority, the Program Executive Officer, believed that preparation of a compliant ISP was more essential for the full-rate production decision than the LRIP decision that is required by DoD policy. As a result of not completing the ISP as required before the LRIP decision, the program manager was not able to fully inform the current milestone decision authority, the Navy Acquisition Executive, of the CSRR Program's progress and limitations toward achieving the interoperability KPP and completing a TEMP for the *Ohio*-class.

### Policy for Low-Rate Initial Production Readiness

The DoD provides policies and guidance for DoD Components to use in defining system requirements for an ISP. DoD Instruction 5000.2 provides instructions for acquisition program managers to follow when they are readying a program for a milestone decision. DoD Instruction 4630.8, "Interoperability and Supportability of Information Technology and National Security Systems," June 30, 2004, describes DoD policy and responsibilities for interoperability and supportability of information technology, including National Security Systems. Additionally, Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 6212.01C, "Interoperability and Supportability of Information Technology and National Security Systems," November 20, 2003, includes policy for establishing and certifying the security of interoperable (net-ready) and supportable information systems. The Joint Requirements Oversight Council Memorandum (JROCM) 236-03, "Policy for Updating Capabilities Documents to Incorporate the Net-Ready Key Performance Parameter," December 19, 2003, details policy for migrating the interoperability KPP to the new net-ready KPP.

**DoD Instruction 5000.2.** DoD Instruction 5000.2 requires that program managers prepare and obtain approval for an ISP before milestone B, System Development and Demonstration, and milestone C, Production and Deployment, decisions.

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**DoD Instruction 4630.8.** DoD Instruction 4630.8 requires DoD Components to establish an ISP approval process for ACAT II and III programs and to identify interoperability requirements, infrastructure requirements, and other support requirements for information technology and National Security Systems early in the acquisition life cycle. The Instruction states that, at each milestone review, the ISP will become progressively more detailed, and will contain more specific information on operational systems, and technical architecture reviews; security, connectivity, and interoperability issues; and infrastructure and support issues. The Instruction requires that the Director, Operational Test and Evaluation ensure that TEMPs and operational test plans for acquisition programs on his oversight list identify interoperability test requirements for information technology and National Security Systems and emphasize that interoperability and supportability be evaluated as early as possible in a system's development.

**CJCSI 6212.01C.** CJCSI 6212.01C requires program managers to prepare ISPs that contain a net-ready KPP for systems that exchange information with other systems and to replace the requirement for program managers to prepare the Command, Control, Communication, Computers and Intelligence Support Plan. Implementation of the net-ready KPP will make the CSRR interoperable and also comply with the net-centric operations and warfare reference model, applicable Global Information Grid key interface profiles, DoD information assurance requirements, and the supporting integrated architecture products for a given capability. CJCSI 6212.01C states that the interoperability KPPs contained in existing capstone requirements documents will remain valid until they are replaced with completed integrated architectures. Program managers are required to transition from the interoperability KPP to the net-ready KPP by 2006.

CJCSI 6212.01C further requires that program managers describe system dependencies and interface requirements in the ISP in sufficient detail to test and verify that information technology and National Security Systems meet the interoperability and supportability requirements. It also states that the ISP must include system interface descriptions, infrastructure and support requirements, standards profiles, and measures of performance and interoperability. The Joint Staff J-6, Director for Command, Control, Communications, Computers and Intelligence is responsible for coordinating ISP reviews for ACAT II and below programs before the milestone C decision.

**JROCM 236-03.** JROCM 236-03 provides procedures for converting the interoperability KPP to the net-ready KPP and for preparing capabilities documents to support a milestone B or milestone C decision review. The capabilities documents must include one of the following:

- The net-ready KPP.
- The interoperability KPP with a migration strategy to the applicable components of the net-ready KPP.
- A statement that the sponsoring organization will update the interoperability KPP to include all applicable established components of the net-ready KPP within 6 months.

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## Information Support Plan for the Common Submarine Radio Room Program

**Command, Control, Communications, Computers, and Intelligence Support Plan.** In May 2002, the program manager prepared a draft Command, Control, Communications, Computers, and Intelligence Support Plan for the *Ohio*-class, guided-missile submarine for CSRR entry into the system development and demonstration phase of the acquisition process. The draft Command, Control, Communications, Computers, and Intelligence Support plan identified the extent to which the existing equipment and systems could meet the information support, requirements and identified shortfalls in the available or projected support, but it did not identify how to measure CSRR interoperability requirements. When the Program Executive Officer, the milestone decision authority, established the CSRR as an ACAT II program in the development and demonstration phase of the acquisition process, he did not approve the draft Command, Control, Communications, Computers, and Intelligence Support Plan or the replacement draft ISP.

Before he proceeded with the LRIP decision review, the program manager should have prepared an ISP that complied with CJCSI 6212.01C and JROCM 236-03, as required, to ensure that the interoperability KPP and its migration strategy to the net-ready KPP will be adequately evaluated for the CSRR sets that are installed on the *Ohio*-class platform and to identify test requirements to measure whether the CSRR met the interoperability and net-ready KPP requirements. However, the program manager did not complete a compliant ISP for the CSRR Program before he requested the LRIP decision from the milestone decision authority in June 2005.

**Updating the Command, Control, Communications, Computers, and Intelligence Support Plan to ISP Requirements.** During the audit, the program manager updated the draft Command, Control, Communications, Computers and Intelligence Support Plan to state that the interoperability KPP would continue to be used, but it did not include a strategy to transition from the interoperability KPP to the net-ready KPP, as required by CJCSI 6212.01C. In addition, because the Navy had not completed the capability development document, the Joint Staff J-6 could not review and validate the draft ISP.

Until the Navy replaces the interoperability KPP with the net-ready KPP in the capability development document and adheres to the ISP, Navy submarine commanders will not have assurance that the CSRR will satisfy requirements to communicate securely by telephone, radio, or Internet with surface vessels, land-based networks, and satellites. As indicated in DoD Instruction 4630.8, the ISP is a tool that should be used to identify potential issues and propose solutions for implementing the net-ready KPP.

**Testing for Interoperability.** Because the CSRR Program is on the Director, Operational Test and Evaluation oversight list, the program manager cannot obtain approval of the TEMP for the *Ohio*-class until he completes the ISP. As of

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July 2005, the Navy had not fully evaluated whether the system meets the interoperability requirements listed in the approved capstone requirements document.

## **Establishing an Information Support Plan for the Low-Rate Initial Production Decision**

The previous milestone decision authority, the Program Executive Officer, believed that a compliant ISP was more essential for the full-rate production decision than the LRIP decision review required by DoD policy. During the audit, the Program Executive Officer stated that, based on the requirements in Secretary of the Navy Instruction 5000.2B,<sup>2</sup> the plan did not need to be approved until the full-rate production decision review if the CSRR ISP was progressing towards completion. In addition, the Program Executive Officer stated that the ISP was needed to support the full-rate production decision because the Joint Interoperability Test Command will need to certify that the system's interoperability is sufficient to support a fielding decision. The Program Executive Officer misstated the ISP preparation requirements of DoD Instruction 5000.2 and Navy Instruction 5000.2B, which require the ISP to be approved before the milestone C decision.

A representative for the Assistant Secretary of Defense for Networks and Information Integration, who is knowledgeable about the CSRR Program, stated that preparing a completed ISP earlier in the acquisition process would inform the milestone decision authority of program risks and their effect on program cost and schedule. The representative also stated that because the basic architecture for the *Virginia*- and the *Sea Wolf*-classes was also used for the *Ohio*-class, the Navy should submit a single ISP for those classes to the Assistant Secretary of Defense for Networks and Information Integration for approval.

In June 2005, the program manager stated that after being notified of the audit finding on the ISP, he developed and submitted a revised ISP plan for approval. A representative from the Office of the Assistant Secretary of the Navy (Research, Development and Acquisition) confirmed that the Navy Chief Engineer and the Navy Chief Information Officer reviewed and concurred with the plan, and that the Program Executive Officer, the milestone decision authority, signed off on the plan. To complete the review process in accordance with CJCSI 6212.01C, the Navy needs to coordinate the ISP with the Joint Staff J-6; however, the Joint Staff J-6 will not coordinate on the ISP until the Navy has an approved capability development document. For systems that receive or transmit information, the capability development document specifies the quality of service needed to support interoperability requirements. Until the capability development document is approved, the ISP cannot specify the information support requirements necessary for the quality of service defined in the capability development document.

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<sup>2</sup> Secretary of the Navy Instruction 5000.2B applied during most of the CSRR development. The Instruction was updated on November 11, 2004, to Secretary of the Navy Instruction 5000.2C.

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## Conclusion

Without an approved ISP before the LRIP decision in June 2005, the program manager was not able to fully inform the milestone decision authority of the CSRR Program's progress toward achieving the interoperability KPP and completing the TEMP before conducting operational testing of the *Ohio*-class. Until the program manager completes the ISP coordination process with the Joint Staff J-6, the milestone decision authority will not have the information needed to determine whether the system should proceed further through the acquisition process. Specifically, the milestone decision authority does not have assurance that the system is compatible with the existing command, control, communication, computers and intelligence infrastructure of other communication systems and whether it is able to meet the interoperability and information needs of the warfighter. Furthermore, the program manager, as recommended by the Office of the Assistant Secretary of Defense for Networks and Information Integration, should determine the feasibility of preparing one overarching ISP for the CSRR to cover all submarine classes in coordination with the program managers for the *Virginia*- and *Sea Wolf*-classes.

## Management Comments on the Finding and Audit Response

**Navy Comments.** The Deputy Assistant Secretary of the Navy (Command, Control Communications, Computers, Intelligence and Space) acknowledged that the Joint Staff had not reviewed and approved the CSRR Information Support Plan before the June 22, 2005, Milestone C LRIP program review. However, he stated that the Navy had approved the CSRR Information Support Plan before the program review and that the milestone decision authority was confident that the available support information was of sufficient detail and accuracy to support a positive LRIP decision. The Deputy Assistant Secretary further stated that he did not agree that the Navy was required to complete a separate CSRR Information Support Plan because radio receivers, transmitters, terminals, and crypto devices used in the CSRR Program were developed separately and already met their own documentation and test requirements. However, he stated that the CSRR program office elected to prepare an overarching information support plan to satisfy a requirement levied on the Submarine Exterior Communications System of which the CSRR is a part.

**Audit Response.** We disagree with the Deputy Assistant Secretary's conclusion that a separate CSRR Information Support Plan was not needed because components within the CSRR were developed separately and already met their own documentation and test requirements. As stated in finding A, two of the CSRR components were either still in development or did not function as required. Additionally, even if all CSRR components were fully developed and functioned as required, the Navy needs to have a CSRR Information Support Plan to identify interoperability requirements, infrastructure requirements, and other support requirements to ensure that the CSRR components, when integrated, will satisfy the warfighter's CSRR information technology and the National Security

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System requirements. We commend the CSRR program manager for going forward with preparing and gaining Joint Staff review and approval of a CSRR Information Support Plan.

## **Recommendations, Management Comments, and Audit Response**

### **B. We recommend that the Program Manager, Common Submarine Radio Room Program:**

**1. Coordinate the information support plan with the Director for Command, Control, Communications, and Computers Systems, Joint Staff J-6, for review and validation before beginning operational testing of the Common Submarine Radio Room on the *Ohio*-class as required by the Joint Chiefs of Staff Instruction 6212.01C, "Interoperability and Supportability of National Security Systems, and Information Technology," November 20, 2003.**

**2. Together with the program managers for the *Virginia*- and *Sea Wolf*-classes, determine the feasibility of preparing one overarching information support plan for the Common Submarine Radio Room in all submarine classes and jointly establish the plan.**

**Navy Comments.** The Program Manager, Common Submarine Radio Room Program concurred with the audit recommendations, stating that the CSRR Information Support Plan would be coordinated with the Director for Command, Control, Communications, and Computer Systems, Joint Staff, J-6 when it is entered into the Joint Command, Control, Communications, Computers, and Intelligence Program Assessment Tool. During the phase one modernization upgrade planned for in FY 2008, he stated that, as Participating Program Manager for all CSRR installations on all submarine classes, he would revise and prepare an overarching CSRR information support plan for all submarine classes. The Program Manager stated that the estimated completion date for the overarching CSRR Information Support Plan was September 2007.

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## C. Life-Cycle Cost Estimate for the Common Submarine Radio Room Program

The program manager did not timely determine the effect that delays in completing the development test program or the decision to support spiral development through 2024 had on CSRR Program life-cycle costs because the Space and Naval Warfare Systems Command did not require program offices to maintain updated life-cycle cost estimates between milestone decision points or to document the effect of significant events on overall program costs. As a result, the program manager did not provide the milestone decision authority and the Navy resource sponsor with the cost information they needed to timely assess the magnitude of program costs and to make timely decisions for the CSRR Program budget.

### Life-Cycle Cost Requirements

**DoD Guidance.** DoD Directive 5000.1, “The Defense Acquisition System,” May 12, 2003, and DoD Instruction 5000.2 provide acquisition program managers with mandatory policies and procedures for managing all acquisition programs. Secretary of the Navy Instruction 5000.2C, “Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System,” November 19, 2004, implements DoD guidance and establishes Navy mandatory acquisition procedures for major and non-major defense acquisition programs.

**DoD Directive 5000.1.** DoD Directive 5000.1 states that project managers are accountable for credible cost, schedule, and performance reporting to the milestone decision authority.

**DoD Instruction 5000.2.** DoD Instruction 5000.2 requires the milestone decision authority to assess program affordability at each milestone decision point. The Instruction also requires program managers to report ACAT changes to the milestone decision authority as soon as the program is within 10 percent of the next ACAT level.

**Secretary of the Navy Instruction 5000.2C.** Secretary of the Navy Instruction 5000.2C requires program managers to submit a program affordability analysis, which includes life-cycle costs, for assessment at each program decision point. The Instruction also requires program managers to submit an ACAT designation change request for approval when program cost increases exceed the cost threshold for the next ACAT level. Further, the Instruction requires program managers to prepare a program deviation report when cost parameters in the acquisition program baseline agreement are breached.



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## **Significant Events Affecting the Life-Cycle Cost Estimate**

The program manager could not complete developmental testing for the integrated architecture to ready it for operational testing. According to a representative for the program manager, the CSRR development test program could not be completed because critical components were not available to be integrated into the architecture. As a result, the LRIP decision was delayed from July 2004 to June 2005.

The program manager stated that additional testing of the CSRR would be required because the late delivery of components resulted in the interim use of alternative legacy components as replacements. The additional testing increased program costs. Although the program manager first became aware of delays in obtaining components through meetings of the Design Build Management Team in October 2003, he did not update the May 2000 CSRR life-cycle cost estimate.

In January 2004, the program manager submitted Change 1 to the acquisition program baseline agreement which reported that the CSRR Program's estimated life-cycle costs had increased from \$554 million to \$614 million. In March 2005, the program manager updated the life-cycle cost estimate to \$1.43 billion in preparation for the LRIP decision planned for June 2005. A representative for the program manager stated that the primary reasons for the greater costs were increased unit costs for the components and increased support costs because of the Navy decision to support spiral development of the CSRR for another 4 years through FY 2024.

## **Command Policy for Updating Life-Cycle Cost Estimates**

At the start of the review in October 2004, the Space and Naval Warfare Systems Command did not require program managers for ACAT III programs to update life-cycle cost estimates between milestone decision points or when significant events affected overall program costs. A representative for acquisition policy within the Office of the Program Executive Officer acknowledged the need for a policy that required acquisition program managers for ACAT III and IV programs to monitor and update life-cycle cost estimates between milestone decision points. The representative stated that an acquisition policy would be implemented.

In January 2005, the Program Executive Officer signed a policy requiring acquisition program managers to monitor and update program life-cycle cost estimates. Accordingly, the CSRR Program Manager tasked the support contractor, Booz Allen Hamilton, San Diego, California, to monitor and update program costs after submitting the March 2005 cost estimate.

## **Conclusion**

The program manager did not timely provide the milestone decision authority and the Navy resource sponsor with the cost information they needed to timely assess the magnitude of program costs and to make timely decisions concerning the

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CSRR Program budget. However, during the audit, the Program Executive Officer revised the cost-estimating policy and the program manager tasked the support contractor with monitoring and updating the CSRR Program's life-cycle cost estimate in compliance with the policy. Compliance with the new cost estimating policy should result in timely notification to the acquisition decision makers; therefore we are not making a recommendation to accompany this finding. We commend the Program Executive Officer and the CSRR Program Manager for taking corrective actions during the audit.

## **Management Comments on the Finding**

**Navy Comments.** The Deputy Assistant Secretary of the Navy (Command, Control, Communications, Computers, Intelligence and Space), Office of the Assistant Secretary of the Navy, Research, Development and Acquisition responded for the program manager. He commented that in addition to taking corrective actions cited by the draft report, the CSRR Program Manager has also scheduled an independent cost estimate to adequately define and independently verify all costs before the FY 2006 program review.

For the complete text of the Navy's comments, see the Management Comments section of the report.

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## Appendix A. Scope and Methodology

We evaluated whether the program manager was cost-effectively and efficiently readying the CSRR Program for the production phase of the acquisition process. Consequently, we focused the review on the areas of timely meeting CSRR requirements, timely preparing information system security requirements, and timely updating program cost estimates. We performed this audit from September 2004 through June 2005 in accordance with generally accepted government auditing standards.

We reviewed documentation dated from February 1995 through April 2005, which we obtained from the Program Executive Office, Command, Control, Communication, Computers and Intelligence, San Diego, California; the Naval Sea Systems Command, Washington, D.C.; the Naval Undersea Warfare Center Division, Newport, Rhode Island; Electric Boat, Groton, Connecticut; and Lockheed Martin Tactical Systems, Eagan, Minnesota.

To accomplish the audit objectives, we took the following steps:

- We reviewed DoD Instruction 5000.2, “Operation of the Defense Acquisition System,” May 12, 2003, to determine the requirements for conducting an operational assessment of the radio room for the *Ohio*-class guided-missile submarine before LRIP.
- We reviewed DoD Instruction 5000.2 to determine ISP preparation requirements in the acquisition process. We also reviewed DoD Instruction 4630.8, “Interoperability and Supportability of Information Technology and National Security Systems,” June 30, 2004, to determine whether the program manager was satisfying ISP requirements and the requirements of CJCSI 6212.01C, “Interoperability and Supportability of Information Technology and National Security Systems,” November 20, 2003, to determine the need for an ISP. Further, we reviewed Joint Requirements Oversight Council Memorandum, “Policy for Updating Capabilities Documents to Incorporate the Net-Ready Key Performance Parameter,” December 19, 2003, to determine DoD policy for transitioning from the interoperability KPP to the net-ready KPP.
- We reviewed DoD Directive 5000.1, “The Defense Acquisition System,” May 12, 2003; DoD Instruction 5000.2; and Secretary of the Navy Instruction 5000.2C, “Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System,” November 19, 2004, to determine the requirements for updating the life-cycle cost estimate for the CSRR Program.

**Use of Computer-Processed Data.** We did not use computer-processed data to perform this audit.

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**Use of Technical Assistance.** A computer engineer from the Technical Assessment Division, Office of the DoD Assistant Inspector General for Auditing participated in the review of the CSRR Program. Specifically, the computer engineer evaluated the information assurance process and the level of software failures that required alternative system solutions.

**Government Accountability Office High-Risk Area.** The Government Accountability Office has identified several high-risk areas in DoD. This report provides coverage of the DoD Weapons System Acquisition high-risk area.

## **Prior Coverage**

No prior coverage has been conducted on the CSRR Program during the last 5 years.

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## Appendix B. Glossary

**Acquisition Category II.** An Acquisition Category II program is a major system that does not meet the criteria for an ACAT I program. A major system is a program estimated by the DoD Component Head to require an eventual expenditure for Research, Development, Test and Evaluation funds of more than \$140 million in FY 2000 constant dollars, or for procurement funds of more than \$660 million in FY 2000 constant dollars, or those designated by the DoD Component Head to be an ACAT II program.

**Acquisition Category III.** Acquisition Category III programs are those acquisition programs that do not meet the criteria for ACAT I, ACAT IA, or ACAT II programs. The milestone decision authority is designated by the Command Acquisition Executive at the lowest appropriate level. This category includes less-than-major automated information systems.

**Acquisition Program Baseline Agreement.** An acquisition program baseline agreement prescribes the key cost, schedule, and cost constraints in the acquisition phase succeeding the milestone for which it was developed. The milestone decision authority approves the agreement, which is prepared by the acquisition program manager.

**Acquisition Strategy.** An acquisition strategy is a business and technical management approach designed to achieve program objectives within the resource constraints imposed. It is the framework for planning, directing, contracting for, and managing a program. It provides a master schedule for research, development, testing, production, fielding, modification, post-production management, and other activities essential for program success. The acquisition strategy is the basis for formulating functional plans and strategies.

**Capability Development Document.** The capability development document captures information necessary to develop a proposed program, normally using an evolutionary acquisition strategy. It outlines an affordable increment of militarily useful, logistically supportable, and technically mature capability and is used to support program initiation, the Milestone B review.

**Capstone Requirements Document.** The capstone requirements document contains the capabilities-based requirements and provides a common framework and operational concept for developing the capability development document(s) for one or more weapon systems. The Joint Requirements Oversight Council retains the authority to specifically direct the development of a new capstone requirements document as necessary.

**Developmental Test and Evaluation.** Developmental test and evaluation is any testing that assists in the development and maturation of products, product elements, or manufacturing or support processes. It is any engineering-type test used to verify the status of technical progress, verify that design risks are minimized, substantiate achievement of contract technical performance, and certify readiness for initial operational testing. Developmental tests generally

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require instrumentation, and measurements are accomplished by engineers, technicians, or soldier operator-maintainer test personnel in a controlled environment to facilitate failure analysis.

**Full Operational Capability.** Full operational capability is the capability to effectively employ a weapon, or item of equipment, or a system of approved specific characteristics, which is operated by a trained, equipped, and supported military unit or force.

**Global Information Grid.** The Global Information Grid is the basis for net-centric warfare that collects, processes, stores, disseminates, and manages information on demand to warfighters, policy makers, and support personnel. The Global Information Grid includes all owned and leased hardware, software, and services necessary to achieve information superiority. It supports all DoD, National Security Systems, and related intelligence community missions and functions in war and in peace. The Global Information Grid provides information support from all operating locations and interfaces with coalition, allied, and non-DoD users and systems.

**Incremental Development.** The incremental development approach determines user needs and defines the overall architecture, but then delivers the system in a series of increments (software builds). The first build incorporates a part of the total planned capabilities, the next build adds more capabilities, the next one adds more capabilities, and so on, until the entire system is complete.

**Information Support Plan.** The information support plan, formerly known as the Command, Control, Communications, Computers, and Intelligence Support Plan, identifies and documents information needs, infrastructure support, and information technology and National Security System interface requirements and dependencies. The ISP focuses on net-centricity, interoperability, supportability, and sufficiency concerns.

**Interoperability.** Interoperability is the ability of systems, units, or forces to provide data, information, materiel, and services to (and accept the same from) other systems, units, or forces and to use the data, information, materiel, and services so exchanged to enable them to operate effectively together. National Security System and information technology system interoperability includes the technical exchange of information and the end-to-end operational effectiveness of that exchanged information as required for mission accomplishment. Interoperability is a mandatory key performance parameter.

**Key Performance Parameters.** Key performance parameters (KPPs) are those minimum attributes or characteristics considered most essential for an effective military capability. KPPs cited in the capability development document and the capabilities production document are included verbatim in the acquisition program baseline agreement.

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**Life-Cycle Costs.** Life-cycle costs are the total system acquisition and ownership costs to the Government over its useful life. They include the cost of development, acquisition, operations, support (to include manpower), and, where applicable, disposal. For DoD systems, life-cycle costs are also called total ownership costs.

**Low-Rate Initial Production.** Low-rate initial production (LRIP) is the first part of the production and deployment phase whose purpose is to establish an initial production base for the system, permit an orderly ramp-up that will lead to a smooth transition to full-rate production, and provide production-representative articles for initial operational test and evaluation and full-up live-fire testing. This phase concludes with a full-rate production decision review to authorize full-rate production and deployment. For major DoD acquisition programs, LRIP quantities of more than 10 percent of the acquisition objective must be reported in the Selected Acquisition Report. For ships and satellites, LRIP is the minimum quantity and rate that helps establish initial mobilization.

**Milestone Decision Authority.** The milestone decision authority is the designated individual who has the overall responsibility for a program. The milestone decision authority approves entry of an acquisition program into the next phase of the acquisition process and is accountable for cost, schedule, and performance reporting to higher authority.

**National Security System.** A National Security System is any telecommunications or information system operated by the U. S. Government, the function, operation, or use of which involves intelligence activities, cryptologic activities related to national security, command and control of military forces, and equipment that is an integral part of a weapons system or is critical to the direct fulfillment of military or intelligence missions.

**Net Centric.** Net centric is the exploitation of advancing technology that allows users to access applications and services through Web services. Net-centricity comprises interoperable computing and communication components and provides users with real-time access to information resources.

**Net-Ready Key Performance Parameter.** A net-ready Key Performance Parameter (KPP) assesses information needs, information timeliness, information assurance, and network functions required for information exchange and use. A net-ready KPP consists of measurable and testable characteristics, performance metrics, or both, required for the timely, accurate, and complete exchange and use of information to satisfy information needs for a given capability. The net-ready KPP includes compliance with the net-centric operations and warfare reference model; compliance with applicable Global Information Grid key interface profiles; verification of compliance with DoD information assurance requirements; and supporting integrated architecture products that are required to assess information exchange and use for a given capability. A net-ready KPP is documented in a capability development document, a capabilities production document, and a capstone requirements document.

**Operational Assessment.** An operational assessment is an evaluation of operational effectiveness and operational suitability by an independent

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operational test organization, with user support as required, on other than production systems. The operational assessment focuses on significant trends in development, programmatic voids, risk areas, adequacy of requirements, and the ability of the program to support adequate operational testing. An operational assessment may be conducted at any time using technology demonstrators, prototypes, mock-ups, and engineering development models or simulations, but will not substitute for the initial operational test and evaluation necessary to support full-rate production decisions. An operational assessment is normally conducted in support of a low-rate initial production decision.

**Operational Test and Evaluation.** Operational test and evaluation is the field test, under realistic conditions, of any item (or key component) of a weapon, equipment, or munitions to determine the effectiveness and suitability of the weapon, equipment, or munitions for use in combat by typical military users, and the evaluation of the test results.

**Risk.** Risk is the measure of the inability to achieve program objectives within defined cost, schedule, and technical constraints of all aspects of the program.

**Spiral Development.** The spiral development approach develops and delivers a system in builds, but differs from the incremental approach by acknowledging that, because the user need is not fully formed at the beginning of development, all requirements are not initially defined. The initial build delivers a system based on the requirements as they are known at the time development is initiated, and then succeeding builds are delivered that meet additional requirements as they become known.

**System Development and Demonstration.** The system development and demonstration phase (milestone B) is the third phase of the DoD system acquisition process and consists of system integration and system demonstration. This phase also contains a design readiness review at the conclusion of the system integration.

**Technology Development.** Technology development is the second phase (milestone A) of the DoD system acquisition process, whose purpose is to reduce technology risk and to determine the appropriate set of technologies to be integrated into the full system. This phase is normally funded only for advanced development work and does not mean the initiation of a new acquisition program.

**Test and Evaluation Master Plan.** The TEMP documents the overall structure and objectives of the test and evaluation program. It provides a framework within which to generate detailed test and evaluation plans and to document schedule and resource implications associated with the test and evaluation program. The TEMP identifies the necessary developmental test and evaluation, operational test and evaluation, and live-fire test and evaluation activities.



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## Appendix C. Description and Status of Key Technical Components and Software

The CSRR system integrates components, software, and interfaces into a radio room architecture that can simultaneously receive and transmit messages when a submarine is at or below periscope depth. Component and software problems caused test schedule delays and configuration changes during the development of the CSRR for the *Ohio*-, *Virginia*-, and *Sea Wolf*-classes. The delays in testing resulted in the increased risk of procuring and installing the CSRR on submarines without knowing whether it meets user requirements. Until the components and software are fully completed, the CSRR cannot be fully tested. A description and the status of some of the key components, software, and interfaces follow.

**Channel Service Unit/Data Service Unit.** The channel service unit/data service unit connects digital network channels on the submarine to data equipment at shore-based facilities. The unit translates transmissions from the submarine for the shore-based data equipment so that the shore-based equipment can accept and use the submarine data. Due to an information assurance risk identified in October 2004, the unit was disconnected.

**Control and Management Software.** The Control and Management Software provides centralized, computer-based control and monitoring capabilities for CSRR equipment. This software, developed by Lockheed Martin, manages components from Q-70 workstations. As of July 2005, the software required additional developmental testing.

**Digital Modular Radio.** The Digital Modular Radio component has software that is programmable, has modular hardware and software, and is capable of being reconfigured to operate with different waveforms and protocols anywhere in the ultra high frequency band. The Digital Modular Radio also provides embedded communication security functions. Each Digital Modular Radio includes four multiple, independent levels of security compartments. Because of software development issues, the Digital Modular Radio was not completed as planned. The program manager for this component expects to have the new version of the software ready by December 2005.

**Digital Modular Radio Power Amplifiers.** The amplifiers amplify signal strength for high frequency and ultra high frequency transceivers. Shipment was delayed and, although some were received in late June 2005, their availability is still undecided.

**Extremely Low Frequency.** Extremely low frequency is a circuit that operates at extremely low radio frequency bandwidths and is used as a “bellringer” to notify submarine crews when they have incoming messages. Submarine crews must then come to a depth at which they can receive additional message traffic by raising their antennas to receive messages. Because this circuit operates at such

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low bandwidths, the submarine is able to maintain stealth. As a result of an information assurance problem, the circuit was shut off and the fleet requested removal of the circuit from the submarines in June 2005.

**Extremely High Frequency.** Extremely high frequency is a circuit for extremely high radio frequency bandwidths. This circuit connects to military, strategic, tactical, and relay satellite communications.

**Extended Turn (Extended Simple Mail Transfer Protocol Client/Server Mail Command).** Extended Turn software is required for the Submarine Single Messaging Solution to be able to query shore-based file servers for delivery of e-mail to submarines. The correct software was not included when the messaging system was received by the CSRR Program, so a delay resulted. The correct software version has been received and included in the conversion baseline.

**Follow-On Terminal.** The Follow-On Terminal component is a satellite communications terminal that operates at extremely high frequency through the Military Strategic Tactical and Relay Satellite, the Fleet Satellite Communications System Extremely High Frequency Package Satellite, the Ultra High Frequency Follow-On/Extremely High Frequency/Enhanced Satellite, and the Polar Satellite to other satellite communications terminals. These components were ready ahead of schedule.

**Global Broadcast Service.** The Global Broadcast Service component is an emerging, worldwide, high capacity, one-way transmission capability that supports distribution of a wide variety of data, video, imagery, audio, and intelligence information directly to theater and warfighter locations. The Global Broadcast Service operates as a broadcast distribution mechanism with a high bandwidth forward channel (to theater and warfighter assets) through the Ultra High Frequency Follow-On Satellite. The development of Global Broadcast Service was delayed because of problems with the development of the Internet protocol software.<sup>1</sup> The Air Force program manager corrected the problems and the component is ready for use.

**Information Screening and Delivery System.** The Information Screening and Delivery System component provides the ability for the Submarine Single Messaging Solution to receive the submarine Internet Protocol broadcast through passive reception. The final release of the software will be available in August 2005.

**Main Router.** The Main Router interfaces connect network and routing functions within the main network to the other data enclaves through in-line network encryption and to off-hull data networks. Router configurations are established during initial setup procedures and are not modified during normal operations.

**Medium-Rate, Channel Access Protocol.** The Medium-Rate, Channel Access Protocol provides the necessary buffering to allow the network to operate over medium data rate paths. This protocol also allows for conversion among Internet

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<sup>1</sup> A protocol is a set of rules that allows two devices to communicate.

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protocol or Ethernet traffic and half-duplex information. The correct version of the software was delayed in shipment, but has been received and included in the conversion baseline.

**Multifunctional Cryptographic System.** The Multifunctional Cryptographic System allows the CSRR to encrypt and decrypt information. The system is interoperable with existing communication security systems and equipment, and it consists of input/output interfaces and buffers, control functions, and cryptographic devices. It accepts plain text analog voice, digital voice, and digital data from various bandwidth systems and transmits/receives encrypted digital signals. The CSRR configuration consists of many independent levels of security for sensitive compartmented information, secret, and top secret enclaves. Because the component was not developed as planned, the Navy decided to use an alternative component and canceled the Multifunctional Cryptographic System Program.

**Multi-TADIL (Tactical Data Information Link) Capability.** This capability converts legacy tactical-data-link message traffic to and from the network-based formats for transfer down-hull on the submarine. This component's delayed delivery was resolved before October 2004.

**Q-70.** The Q-70 main computer system will be the Submarine Common Display System. The tactical workstation is an open system that provides the flexibility and modularity necessary to support Exterior Communication System/Subsystem program technology insertion. Together with component-based software, the Q-70 allows many of the implementation decisions to be delayed as appropriate. The review of the CSRR Program found no problems with this component.

**Radio Frequency Distribution and Control System.** The Radio Frequency Distribution and Control System is an interface component between the radio room and the antenna systems to provide off-hull communications. The system consists of multiple units operating under the control of a central processor. The required version was delayed in shipment, but is now included in the conversion baseline.

**Super High Frequency.** The super high frequency is a circuit for a radio frequency bandwidth in the DoD high bandwidth system that connects submarines to the Ka Band Global Broadcast Service. It uses the submarine high data rate antenna for extremely high frequency military and commercial bandwidths. No problems were found with this circuit.

**Submarine Low Frequency/Very Low Frequency Versa Module Europa-Bus Receiver.** The Submarine Low Frequency/Very Low Frequency Versa Module Europa-Bus Receiver receives and processes multiple low frequency links simultaneously. The Receiver detects errors and corrects decoding problems and uses special anti-jam decoding and noise-processing techniques to support extremely low frequency/very low frequency/low frequency communications. The CSRR Program review found no problems with this component.

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## Appendix D. Another Matter of Interest

During the audit, we noted another matter of interest concerning the CSRR Program's acquisition strategy.

### Acquisition Strategy

Although the CSRR Program began in the post-milestone B phase of the acquisition process, the program manager did not include technology development as a part of his acquisition strategy to identify the maturity level required for component and software design at the completion of each increment. The Interim Defense Acquisition Guidebook, which was used to explain DoD policy when the acquisition strategy was approved in 1992, stated that the acquisition strategy should identify the first block of evolutionary development or the initial deployment capability. DoD Instruction 5000.2 states that an acquisition program should develop a technology development strategy that provides the preliminary description of how the program will be divided into technology spirals and development increments before milestone B. The Instruction further states that after the program is approved to enter the system development and demonstration phase of the acquisition process at milestone B, the technology development strategy should be included as a part of the acquisition strategy. However, the milestone decision authority approved the acquisition strategy that the program manager prepared, although it did not include a comprehensive technology development strategy that described each increment. As a result, increment 0, which is under development as the baseline system for the *Ohio*-class, was not adequately defined for the milestone decision authority to make an informed decision about the status and maturity of the CSRR Program. Planning the maturity level of each increment as part of a technology development strategy could assist Navy acquisition decision makers in making the most cost-effective decisions when acquiring future CSRR technology.

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## **Appendix E. Report Distribution**

### **Office of the Secretary of Defense**

Under Secretary of Defense for Acquisition, Technology, and Logistics  
Under Secretary of Defense (Comptroller)/Chief Financial Officer  
    Deputy Chief Financial Officer  
    Deputy Comptroller (Program/Budget)  
Assistant Secretary of Defense (Network and Information Integration)/DoD CIO  
Director, Operational Test and Evaluation  
Director, Program Analysis and Evaluation

### **Joint Staff**

Director, Joint Staff

### **Department of the Army**

Auditor General, Department of the Army

### **Department of the Navy**

Assistant Secretary of the Navy (Manpower and Reserve Affairs)  
Assistant Secretary of the Navy (Research, Development, and Acquisition)  
    Commander, Space and Naval Warfare Systems Command  
        Program Executive Officer (Command, Control, Communications, Computers and  
        Intelligence and Space)  
        Program Manager, Common Submarine Radio Room  
Naval Inspector General  
Auditor General, Department of the Navy  
Commander, Operational Test and Evaluation Force

### **Department of the Air Force**

Auditor General, Department of the Air Force

### **Other Defense Organization**

Director, Defense Contract Management Agency

### **Non-Defense Federal Organization**

Office of Management and Budget

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## **Congressional Committees and Subcommittees, Chairman and Ranking Minority Member**

Senate Committee on Appropriations  
Senate Subcommittee on Defense, Committee on Appropriations  
Senate Committee on Armed Services  
Senate Committee on Homeland Security and Governmental Affairs  
House Committee on Appropriations  
House Subcommittee on Defense, Committee on Appropriations  
House Committee on Armed Services  
House Committee on Government Reform  
House Subcommittee on Government Efficiency and Financial Management, Committee on Government Reform  
House Subcommittee on National Security, Emerging Threats, and International Relations, Committee on Government Reform  
House Subcommittee on Technology, Information Policy, Intergovernmental Relations, and the Census, Committee on Government Reform

# Department of the Navy Comments



DEPARTMENT OF THE NAVY  
OFFICE OF THE ASSISTANT SECRETARY  
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WASHINGTON DC 20350-1000

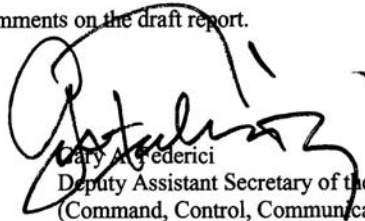
August 29, 2005

MEMORANDUM FOR INSPECTOR GENERAL OF THE DEPARTMENT OF  
DEFENSE

SUBJECT: Draft Report on the Audit of the Common Submarine Radio Room (CSRR)

Your memorandum of 29 July 2005 provided the subject draft report for review  
and comment.

Tabs A and B provide the Navy comments on the draft report.

  
Gary A. Federici  
Deputy Assistant Secretary of the Navy  
(Command, Control, Communications,  
Computers, Intelligence and Space)

Attachment:  
As stated

Copy to:  
PEO (C4I&Space)  
PMW 770  
CNO (N772)  
NAV IG

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**ASN (RD&A)**  
**Comments on the Draft DoDIG Audit Report**  
**of the**  
**Common Submarine Radio Room (CSRR)**

**Finding A.** The Navy does not concur with the recommendation. The requirements for the program review to authorize the four additional LRIP units are contained within the Acquisition Decision Memo (ADM). Although ship schedules may support some level of OHIO class operational testing prior to the program review, it is the position of the Milestone Decision Authority (MDA) that an operational assessment is not necessary. This position is consistent with the policies of DODINST 5000.2 and SECNAVINST 5000.2C that ties IOT&E to the full-rate production decision. The discussion on page 6 and conclusion on page 8 of the DoDIG draft report states: "The Instruction requires an acquisition program to demonstrate acceptable performance in the development, test and evaluation, and operational assessment phases of the acquisition process before entering into LRIP." DODINST 5000.2 does not establish such a mandatory requirement for LRIP (see section E5.7.6). The statement made is actually a paraphrase of section 3.8.2 that lists the typical entrance criteria for the production and deployment phase of acquisition. The DoDIG has no technical basis to determine the specific level of detail that an MDA requires in order to make an LRIP decision.

**Finding B.** The conclusion states that the CSRR Integrated support Plan (ISP) was not approved prior to the Milestone C LRIP decision. The ISP was in review at the time of the Milestone C brief but was approved (22 June 2005) well before the LRIP decision (by ADM dated 21 July 2005). All information within the ISP was available to support the decision.

The CSRR acquisition program of record (PoR) develops, procures, integrates and installs submarine radio room racks, switches, miscellaneous hardware plus computer hardware and software for overall control of the communications components and terminals. Radio receivers, transmitters, terminals and crypto devices that are obtained from other PoRs, accomplish the connection to the external communications and information infrastructure. These items already meet their own acquisition documentation and test requirements. As such, a CSRR ISP is not required. Rather than obtain a waiver of the ISP for the CSRR PoR, the program office elected to prepare an overarching ISP to satisfy a requirement levied upon the Submarine Exterior Communications System of which the CSRR is part.

Joint review of the CSRR ISP was not completed prior to approval. The CSRR requirements documentation to support the Milestone C decision was not a Capabilities Production Document (CPD) but the equivalent of an approved legacy Operational Requirements Document. As agreed to by the JCS J6 staff, the legacy documentation was valid and sufficient for Milestone C and a CPD should be prepared to support Full Rate Production. Review of the overarching ISP prior to preparation of the CPD would be of limited value. As indicated by the Program Manager's response, the CSRR ISP will be provided for Joint review in conjunction with the review and approval of the CPD.

The Milestone decision Authority was and is confident that the available support information for the CSRR PoR is of sufficient detail and accuracy to support a positive LRIP decision.



PROGRAM MANAGER'S RESPONSE TO  
DODIG DRAFT REPORT NO. D2004AE-0222.000 of 29 JULY 2005  
ON THE ACQUISITION OF THE COMMON SUBMARINE RADIO ROOM PROGRAM (U)

Finding A Recommendation: "We recommend that the Program Manager, Common Submarine Radio Room delay the FY 2006 program review of the four low-rate initial production sets until he obtains an operational assessment which states that the Common Submarine Radio Room for the Ohio-class is potentially operationally effective and suitable."

Finding A Response: The CSRR Program Manager does not concur with this recommendation. As stated in DoD 5000.2 section 3.8.3 LRIP, "This effort is intended to result in completion of manufacturing development in order to ensure adequate and efficient manufacturing capability and to produce the minimum quantity necessary to provide production or production representative articles for IOT&E, establish an initial production base for the system; and to permit an orderly increase in the production rate for the system, sufficient to lead to full-rate production upon successful completion of operational (and live-fire, where applicable) testing."

The FY 2006 low-rate initial production sets will be procured to permit an orderly increase in the production rate of the system towards full rate production capability.

In lieu of the recommended operational assessment to support the PEO review, the Milestone Decision Authority (MDA) has required the program office to demonstrate CSRR system maturity by completion of SEAWOLF developmental testing and land-based hardware and software reliability testing in accordance with a plan approved by the Acquisition Coordination Team (ACT). The ACT will meet bi-monthly to ensure progress towards reaching system maturity is reached. Although not fully developed, this plan will include a complete 60-day test period in April-May 2006, to certify CSRR system robustness prior to installation on the first Ohio-class submarine.

Finding B Recommendation: We recommend that the Program Manager, Common Submarine Radio Room Program:

1. Coordinate the information support plan with the Director for Command, Control, Communications, and Computer Systems, Joint Staff J-6, for review and validation before beginning operational testing of the Common Submarine radio Room on the Ohio-class as required by the Joint Chiefs of Staff Instruction 6212.01C, "Interoperability and Supportability of the National Security Systems, and Information Technology," November 20, 2003.

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2. Together with the program managers for the *Virginia*- and *Sea Wolf*-classes, determine the feasibility of preparing one overarching information support plan for the Common Submarine Radio Room in all submarine classes and jointly establish the plan.

Finding B response: The CSRR Program Manager concurs with this recommendation.

1. The CSRR Information Support Plan (ISP) was in development during the auditor's last visit in April 2005, submitted for approval prior to the June 2005 low-rate initial production decision and was formally approved on 22 June 2005. The CSRR ISP will be coordinated with the Director for Command, Control, Communications, and Computer Systems, Joint Staff J-6 when it is entered into the JCPAT system.

2. During the phase 1 modernization upgrade planned in fiscal year 2008 The CSRR program manager functioning as the Participating Program Manager for all CSRR installations including *Ohio*, *Virginia* and *SeaWolf*-classes, will coordinate with the Ship Program Managers to incorporate *Virginia* and *SeaWolf* CSRR requirements into applicable JCIDS documentation including the ISP. As part of the MDA approval process for this Modernization a revised ISP will be developed that will consolidate all submarine classes. Target completion date is 30 September 2007.

Finding C Recommendation: In reference to the finding of not providing timely Life Cycle Cost information, no recommendation was provided based on the corrective actions already taken. In addition, the IG team commended the Program Executive Officer and the CSRR Program Manager for taking corrective action.

Finding C Response: In addition to the corrective actions cited by the IG, the CSRR program has taken action to schedule an Independent Cost Estimate (ICE) to ensure all costs are adequately defined and independently verified prior to the FY 2006 program review.

## **Team Members**

The Department of Defense Office of the Deputy Inspector General for Auditing, Acquisition and Technology Management prepared this report. Personnel of the Department of Defense Office of Inspector General who contributed to the report are listed below.

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